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IX. "On the Occurrence of Flint-implements, associated with the Remains of Extinct Mammalia, in Undisturbed Beds of a late Geological Period." By Joseph Prestwich, Esq., F.R.S., F.G.S. &c. Received May 26, 1859.

(Abstract.)

The author commences by noticing how comparatively rare are the cases even of the alleged discovery of the remains of man or of his works in the various superficial drifts, notwithstanding the extent to which these deposits are worked; and of these few cases so many have been disproved, that man's non-existence on the earth until after the latest geological changes, and the extinction of the Mammoth, Tichorhine Rhinoceros, and other great mammals, had come to be considered almost in the light of an established fact. Instances, however, have from time to time occurred to throw some doubt on this view, as the well-known cases of the human bones found by Dr. Schmerling in a cavern near Liege,—the remains of man, instanced by M. Marcel de Serres and others in several caverns in France,—the flint-implements in Kent's Cave,—and many more. Some uncertainty, however, has always attached to cave-evidence, from the circumstance that man has often inhabited such places at a comparatively late period, and may have disturbed the original cave-deposit; or, after the period of his residence, the stalagmitic floor may have been broken up by natural causes, and the remains above and below it may have thus become mixed together, and afterwards sealed up by a second floor of stalagmite. Such instances of an imbedded broken stalagmitic floor are in fact known to occur; at the same time the author does not pretend to say that this will explain all cases of intermixture in caves, but that it lessens the value of the evidence from such sources.

The subject has, however, been latterly revived, and the evidence more carefully sifted by Dr. Falconer; and his preliminary reports on the Brixham Cave*, presented last year to the Royal Society, announcing the carefully determined occurrence of worked flints

* On the 4th of May, this year, Dr. Falconer further communicated to the Geological Society some similar facts, though singularly varied, recently discovered by him in the Maccagnone Cave near Palermo.—See Proc. Geol. Soc.

mixed indiscriminately with the bones of the extinct Cave Bear and the Rhinoceros, attracted great and general attention amongst geologists. This remarkable discovery, and a letter written to him by Dr. Falconer on the occasion of his subsequent visit to Abbeville last autumn, instigated the author to turn his attention to other ground, which, from the interest of its later geological phenomena alone, as described by M. Buteux in his "Esquisse Géologique du Departement de la Somme," he had long wished and intended to visit.

In 1849 M. Boucher de Perthes, President of the "Société d'Émulation" of Abbeville, published the first volume of a work entitled "Antiquités Celtiques et Antédiluviennes," in which he announced the important discovery of worked flints in beds of undisturbed sand and gravel containing the remains of extinct mammalia. Although treated from an antiquarian point of view, still the statement of the geological facts by this gentleman, with good sections by M. Ravin, is perfectly clear and consistent. Nevertheless, both in France and in England, his conclusions were generally considered erroneous; nor has he since obtained such verification of the phenomena as to cause so unexpected a fact to be accepted by men of science. There have, however, been some few exceptions to the general incredulity. The late Dr. Rigollot, of Amiens, urged by M. Boucher de Perthes, not only satisfied himself of the truth of the fact, but corroborated it, in 1855, by his "Mémoire sur des Instruments en Silex trouvés à St. Acheul." Some few geologists suggested further inquiry; whilst Dr. Falconer, himself convinced by M. de Perthes' explanations and specimens, warmly engaged Mr. Prestwich to examine the sections.

The author, who confesses that he undertook the inquiry full of doubt, went last Easter, first to Amiens, where he found, as described by Dr. Rigollot, the gravel-beds of St. Acheul capping a low chalk-hill a mile S.E. of the city, about 100 feet above the level of the Somme, and not commanded by any higher ground. The following is the succession of the beds in descending order:—

	Average thickness.
1. Brown brick-earth (*many old tombs and some coins*), with an irregular bed of flint-gravel. No organic remains.	10 to 15 ft.
Divisional plane between 1 *and* 2*a very uneven and indented.*	
2*a*. Whitish marl and sand with small chalk debris. Land	

	Average thickness.
and freshwater shells (*Lymnea*, *Succinea*, *Helix*, *Bithynia*, *Planorbis*, *Pupa*, *Pisidium*, and *Ancylus*, all of recent species) are common, and mammalian bones and teeth are occasionally found	2 to 8 ft.
2*b*. Coarse subangular flint-gravel,—white with irregular ochreous and ferruginous seams,—with tertiary flint pebbles and small sandstone blocks. Remains of shells as above, in patches of sand. Teeth and bones of the elephant, and of a species of horse, ox, and deer,—generally near base. This bed is further remarkable for containing worked flints (" Haches " of M. de Perthes, and " Langues de Chat" of the workmen)	6 to 12 ft.
Uneven surface of chalk.	

The flint-implements are found in considerable numbers in 2*b*. On his first visit, the author obtained several specimens from the workmen, but he was not successful in finding any himself. On his arrival, however, at Abbeville, he received a message from M. Pinsard of Amiens, to whose cooperation he expresses himself much indebted, to inform him that one had been discovered the following day, and was left *in situ* for his inspection. On returning to the spot, this time with his friend Mr. Evans, he satisfied himself that it was truly *in situ*, 17 feet from the surface, in undisturbed ground, and he had a photographic sketch of the section taken*.

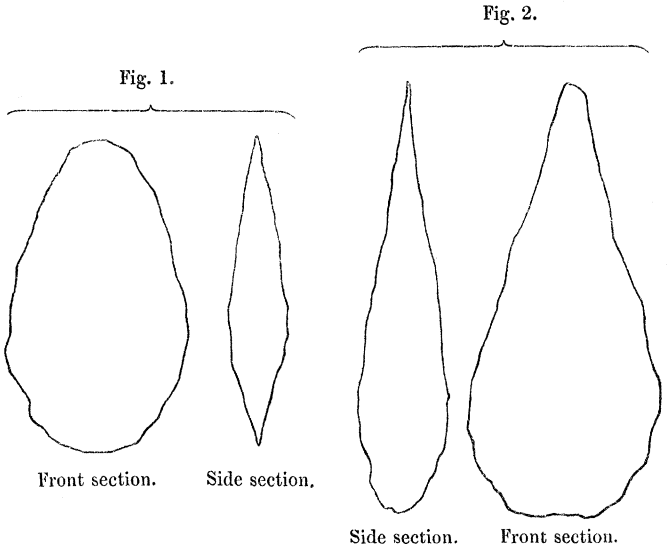
Dr. Rigollot also mentions the occurrence in the gravel of round pieces of hard chalk, pierced through with a hole, which he considers were used as beads. The author found several, and recognized in them a small fossil sponge, the *Coscinopora globularis*, D'Orb., from the chalk, but does not feel quite satisfied about their artificial dressing. Some specimens do certainly appear as though the hole had been enlarged and completed.

The only mammalian remains the author here obtained, were some specimens of the teeth of a horse, but whether recent or extinct, the specimens were too imperfect to determine ; and part of the tooth of an elephant (*Elephas primigenius*?). In the gravel-pit of St. Roch, 1½ mile distant, and on a lower level, mammalian

* On revisiting the pit, since the reading of this paper, in company with several geological friends, the author was fortunate to witness the discovery and extraction by one of them, Mr. J. W. Flower, of a very perfect and fine specimen of flint-implement, in a seam of ochreous gravel, 20 feet beneath the surface. They besides obtained thirty-six specimens from the workmen.—June, 1859.

remains are far more abundant, and include *Elephas primigenius, Rhinoceros tichorhinus, Cervus somonensis, Bos priscus,* and *Equus**; but the workmen said that no worked flints were found there, although they are mentioned by Dr. Rigollot.

At Abbeville the author was much struck with the extent and beauty of M. Boucher de Perthes' collection. There were many forms of flints, in which he, however, failed to see traces of design or work, and which he should only consider as accidental; but with regard to those flint-instruments termed "axes" ("haches") by M. de Perthes, he entertains not the slightest doubt of their artificial make. They are of two forms, generally from 4 to 10 inches long: the outlines of two specimens are represented in the following diagram. They are very rudely made, without any ground surface,



One-third the natural size.

and were the work of a people probably unacquainted with the use of metals. These implements are much rarer at Abbeville than at Amiens, fig. 1 being the common form at the former, and fig. 2 at the latter place. The author was not fortunate enough to find any

* To this list the author has to add the *Hippopotamus,* of which creature four fine tusks were obtained on this last visit.

specimens himself; but from the experience of M. de Perthes, and the evidence of the workmen, as well as from the condition of the specimens themselves, he is fully satisfied of the correctness of that gentleman's opinion, that they there also occur in beds of undisturbed sand and gravel.

At Moulin Quignon, and at St. Gilles, to the S.E. of Abbeville, the deposit occurs, as at St. Acheul, on the top of a low hill, and consists of a subangular, ochreous and ferruginous flint-gravel, with a few irregular seams of sand, 12 to 15 feet thick, reposing upon an uneven surface of chalk. It contains no shells, and very few bones. M. de Perthes states that he has found fragments of the teeth of the elephant here. The worked flints and the bones occur generally in the lower part of the gravel.

In the bed of gravel also on which Abbeville stands, a number of flint-implements have been found, together with several teeth of the *Elephas primigenius*, and, at places, fragments of freshwater shells.

The section, however, of greatest interest is that at Menchecourt, a suburb to the N.W. of Abbeville. The deposit there is very distinct in its character; it occurs patched on the side of a chalk hill, which commands it to the northward; and it slopes down under the peat-beds of the valley of the Somme to the southward. The deposit consists, in descending order, of—

	Average thickness.
1. A mass of brown sandy clay, with angular fragments of flints and chalk rubble. No organic remains. Base very irregular and indented into bed No. 2	2 to 12 ft.
2. A light-coloured sandy clay ("sable gras" of the workmen), analogous to the loess, containing land shells, *Pupa*, *Helix*, *Clausilia* of recent species. Flint-axes and mammalian remains are said to occur occasionally in this bed	8 to 25 ft.
3. White sand ("sable aigre"), with 1 to 2 feet of subangular flint-gravel at base. This bed abounds in land and freshwater shells of recent species of the genera *Helix*, *Succinea*, *Cyclas*, *Pisidium*, *Valvata*, *Bithynia*, and *Planorbis*, together with the marine *Buccinum undatum*, *Cardium edule*, *Tellina solidula*, and *Purpura lapillus*. The author has also found the *Cyrena consobrina* and *Littorina rudis*. With them are associated numerous mammalian remains, and, it is said, flint-implements.....	2 to 6 ft.
4. Light-coloured sandy marl, in places very hard, with *Helix*, *Zonites*, *Succinea*, and *Pupa*. Not traversed	3 +

The Mammalian remains enumerated by M. Buteux from this pit are,—*Elephas primigenius, Rhinoceros tichorhinus, Cervus somonensis*?, *Cervus tarandus priscus, Ursus spelæus, Hyæna spelæa, Bos primigenius, Equus adamaticus,* and a *Felis*. It would be essential to determine how these fossils are distributed—which occur in bed No. 2, and which in bed No. 3. This has not hitherto been done. The few marine shells occur mixed indiscriminately with the freshwater species, chiefly amongst the flints at the base of No. 3. They are very friable and somewhat scarce. It is on the top of this bed of flints that the greater number of bones are found, and also, it is said, the greater number of flint-implements. The author, however, only saw some long flint flakes (considered by M. de Perthes as flint knives) turned out of this bed in his presence, but the workmanship was not very clear or apparent; still it was as much so as in some of the so-called flint knives from the peat-beds and barrows. There are specimens, however, of true implements ("haches") in M. de Perthes' collection from Menchecourt; one noticed by the author was from a depth of 5, and another of 7 metres. This would take them out from bed No. 1, but would leave it uncertain whether they came from No. 2 or No. 3. From their general appearance, and traces of the matrix, the author would be disposed to place them in bed No. 2, but M. de Perthes believes them to be from No. 3; if so, it must have been in some of the subordinate clay seams occasionally intercalated in the white sand.

Besides the concurrent testimony of all the workmen at the different pits, which the author after careful examination saw no reason to doubt, the flint-implements ("haches") bear upon themselves internal evidence of the truth of M. de Perthes' opinion. It is a peculiarity of fractured chalk flints to become deeply and permanently stained and coloured, or to be left unchanged, according to the nature of the matrix in which they are imbedded. In most clay beds they become outside of a bright opaque white or porcelainic; in white calcareous or siliceous sand their fractured black surfaces remain almost unchanged; whilst in beds of ochreous and ferruginous sands, the flints are stained of the light yellow and deep brown colours so well exhibited in the common ochreous gravel of the neighbourhood of London. This change is the work of very long time, and of moisture before the opening out of the beds. Now in

looking over the large series of flint-implements in M. de Perthes' collection, it cannot fail to strike the most casual observer that those from Menchecourt are almost always white and bright, whilst those from Moulin Quignon have a dull yellow and brown surface; and it may be noticed that whenever (as is often the case) any of the matrix adheres to the flint, it is invariably of the same nature, texture, and colour as that of the respective beds themselves. In the same way at St. Acheul, where there are beds of white and others of ochreous gravel, the flint-implements exhibit corresponding variations in colour and adhering matrix; added to which, as the white gravel contains chalk debris, there are portions of the gravel in which the flints are more or less coated with a film of deposited carbonate of lime; and so it is with the flint-implements which occur in those portions of the gravel. Further, the surface of many specimens is covered with fine dendritic markings. Some few implements also show, like the fractured flints, traces of wear, their sharp edges being blunted. In fact, the flint-implements form just as much a constituent part of the gravel itself,—exhibiting the action of the same later influences and in the same force and degree,—as the rough mass of flint fragments with which they are associated.

With regard to the geological age of these beds, the author refers them to those usually designated as post-pliocene, and notices their agreement with many beds of that age in England. The Menchecourt deposit much resembles that of Fisherton near Salisbury; the gravel of St. Acheul is like some on the Sussex coast; and that of Moulin Quignon resembles the gravel at East Croydon, Wandsworth Common, and many places near London. The author even sees reason, from the general physical phenomena, to question whether the beds of St. Acheul and Moulin Quignon may not possibly be of an age one stage older than those of Menchecourt and St. Roch; but before that point can be determined, a more extended knowledge of all the organic remains of the several deposits is indispensable.

The author next proceeds to inquire into the causes which led to the rejection of this and the cases before mentioned, and shows that in the case of M. de Perthes' discovery, it was in a great degree the small size and indifferent execution of the figures and the introduction of many forms about which there might reasonably be a difference of opinion;—in the case of the arrow-heads in Kent's

Cave a hidden error was merely suspected;—and in the case of the Liege cavern he considers that the question was discussed on a false issue. He therefore is of opinion that these and many similar cases require reconsideration; and that not only may some of these prove true, but that many others, kept back by doubt or supposed error, will be forthcoming.

One very remarkable instance has already been brought under the author's notice by Mr. Evans since their return from France. In the 13th volume of the 'Archæologia,' published in 1800, is a paper by Mr. John Frere, F.R.S. and F.S.A., entitled "An Account of Flint-Weapons discovered at Hoxne in Suffolk," wherein that gentleman gives a section of a brick-pit in which numerous flint-implements had been found, at a depth of 11 feet, in a bed of gravel containing bones of some unknown animal; and concludes from the ground being undisturbed and above the valley, that the specimens must be of very great antiquity, and anterior to the last changes of the surface of the country,—a very remarkable announcement, hitherto overlooked.

The author at once proceeded in search of this interesting locality, and found a section now exposed to consist of—

	feet.
1. Earth and a few flints	2
2. Brown brick-earth, a carbonaceous seam in middle and one of gravel at base; no organic remains. The workmen stated that two flint-implements (one of which they shortly picked up in the author's presence) had been found about 10 feet from the surface during the last winter	12
3. Grey clay, in places carbonaceous and in others sandy, with recent land and freshwater shells (*Planorbis*, *Valvata*, *Succinea*, *Pisidium*, *Helix*, and *Cyclas*) and bones of Mammalia	4
4. Small subangular flint-gravel and chalk pebbles	$2\frac{1}{2}$
5. Carbonaceous clay (stopped by water)	$\frac{1}{2}+$

The weapons referred to by Mr. Frere are described by him as being found abundantly in bed No. 4; but at the spot where the work has now arrived, this bed is much thinner, and is not worked. In the small trench which the author caused to be dug, he found no remains either of weapons or of bones. He saw, however, in the collection of Mr. T. E. Amyot, of Diss, specimens of the weapons, also an astragalus of the elephant from, it was supposed, this bed,

and, from bed No. 3, the teeth of a horse, closely resembling those from the elephant-bed of Brighton.

The specimens of the weapons figured by Mr. Frere, and those now in the British Museum and elsewhere, present a singular similarity in work and shape to the more pointed forms from St. Acheul.

One very important fact connected with this section, is that it shows the relative age of the bone and implement-bearing beds. They form a thin lacustrine deposit, which seems to be superimposed on the Boulder Clay, and to pass under a bed of the ochreous sand and flint-gravel belonging to the great and latest drift-beds of the district.

The author purposely abstains for the present from all theoretical considerations, confining himself to the corroboration of the facts :—

1. That the flint-implements are the work of man.
2. That they were found in undisturbed ground.
3. That they are associated with the remains of extinct Mammalia.
4. That the period was a late geological one, and anterior to the surface assuming its present outline, so far as some of its minor features are concerned.

He does not, however, consider that the facts, as they at present stand, of necessity carry back Man in past time more than they bring forward the great extinct Mammals towards our own time, the evidence having reference only to relative and not to absolute time; and he is of opinion that many of the later geological changes may have been sudden or of shorter duration than generally considered. In fact, from the evidence here exhibited, and from all that he knows regarding drift phenomena generally, the author sees no reason against the conclusion that this period of Man and the extinct Mammals—supposing their contemporaneity to be proved—was brought to a sudden end by a temporary inundation of the land; on the contrary, he sees much to support such a view on purely geological considerations.

The paper concludes with a letter from Mr. John Evans, F.S.A. and F.G.S., regarding these implements from an antiquarian rather than a geological point of view, and dividing them into three classes:—

1. Flint flakes,—arrow-heads or knives.
2. Pointed weapons truncated at one end, and probably lance or spear heads (fig. 2).

3. Oval or almond-shaped implements with a cutting edge all round, possibly used as sling-stones or as axes (fig. 1).

Mr. Evans points out, that in form and workmanship those of the two last classes differed essentially from the implements of the so-called Celtic period, which are usually more or less ground and polished, and cut at the wide and not the narrow end; and that had they been found under any circumstances, they must have been regarded as the work of some other race than the Celts, or known aboriginal tribes. He fully concurs with Mr. Prestwich, that the beds of drift in which they were found were entirely undisturbed.

X. "Observations on the Discovery in various Localities of the Remains of Human Art mixed with the Bones of Extinct Races of Animals." By Charles Babbage, Esq., M.A., F.R.S. &c. Received May 26, 1859.

Statements have recently been made relative to the discovery of works of human art occurring in a breccia amongst bones of ancient animals, hitherto supposed to have been extinct long anterior to the existence of our race. These observations are supposed by some to prove the great antiquity of the human race; whilst others, equally competent to form an opinion, admit that the intermixture of such remains presents a most perplexing mystery.

Whatever may be the result of yet unpublished or of future and more extensive observations, it is certainly premature to assign this great antiquity to our race, as long as the occurrence of such mixtures can be explained by known causes admitted to be still in action.

Two places have recently been pointed out in which such mixtures are stated to occur:—1st, certain localities in France; 2nd, certain caves in Sicily. The latter have been visited by Dr. Falconer, and as the information respecting them which we at present possess, though small, is yet much more definite than what is known of the French locality, my explanations will chiefly relate to the *latter*.

It is stated that one of the Sicilian caves has its sides perforated by marine animals.

That on penetrating the stalactitical incrustation covering the